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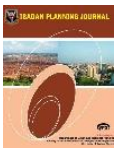

Awareness of Government-provided Solid Waste Management Services in Osun State

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Abstract

Awareness of proper solid waste management is a determining factor in residents' willingness to participate in sustainable waste management practices. This study investigated the residents' awareness of the government-provided solid waste management (SWM) services in Osun State with a view to raising the implications of effective and efficient SWM. A city in each of the senatorial districts of the state was selected for study. Using multi-stage sampling techniques, 403 household heads were surveyed with 157, 139, and 107 in Osogbo, Ile-Ife, and Ede, respectively. The data collected were analysed using descriptive and inferential statistics. The study showed that many of the respondents had a high level of education, which is a significant factor that influenced their ability to be aware of the SWM service. Most of the respondents in the study area were aware of the SWM services put in place by the government through OWMA, in which Osogbo, which is the state capital, had the highest percentage of respondents who were aware. However, the major source through which the respondents became aware of the OWMA services in Osogbo, Ile-Ife, and Ede was through seeing the solid waste collection vehicles which is not effective enough to educate the residents on the importance of proper solid waste management, the need to put the SWM service provided by OWMA to use and the major roles to play for proper usage. As a result of this, the observed patronage level of the service is low.

Keywords
Solid waste management, Residents' awareness, Osun Waste Management Agency (OWMA), Government-provided services, Environmental health

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1. Introduction

Solid waste management is a global environmental concern. UNEP (2024) predicted that solid waste generation will grow from 2.1 billion tons in 2023 to 3.8 billion tons by 2050. However, the World Bank (2018) stated that at least 33% of solid waste generated is not properly managed. Mismanaged solid waste contaminates the water bodies, clogs the drains, causes flooding, transmits diseases, increases respiratory problems, harms animals, causes economic losses, and instigates negative social impacts (Donald et.al., 2021). The entire world is battling with this menace.

However, solid waste management is a more significant challenge in developing countries due to various factors like rapid urbanization, population growth, limited infrastructure, inadequate waste management technologies and expertise, inadequate solid waste management services, and limited public awareness and education (Lilliana et.al., 2012, Steven, 2024). Nigeria is not an exception to this mess. Nigerian cities are among the most polluted, unsanitary, and least attractive globally (Alabi 2004, Adepoju et. al., 2017, Ayobami 2024). The evidence is not far-fetched, as piled-up solid waste can be seen at every turn in the drains and even the highways. Roughly 75% of solid waste collected in the nation ends up in uncontrolled dumpsites (Adepoju et. al., 2017; Mathias, 2023).

In Nigeria, the responsibility of solid waste management is assigned to the Local Governments (LGs) (Federal Republic of Nigeria 1999, Olukanni et. al., 2016, Ahmed et.al., 2022). However, it is worth noting that LGs are not technically and financially equipped to perform this statutory function effectively (Anestina et. al., 2014; Olukanni and Nwafor, 2019). Negligence of this duty has had severe and far-reaching consequences on the environment and public health. There is therefore a necessity for State intervention. Some state governments have constituted agencies that are saddled with the responsibility of solid waste management. Some of them are the Refuse Management and Sanitation Board (REMASAB) in Kano State, Rivers State Waste Management Agency (RIWAMA) in Rivers State, Enugu State Waste Management Authority (ESWAMA) in Enugu State, and Lagos State Waste Management Authority (LAWMA) in Lagos State. Osun State Government is not left out in this waste management initiative to make the environment safe.

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In the year 2010, the Osun State Government (during the administration of Ogbeni Rauf Aregbesola) established an agency charged with the responsibility of coordinating the various services of solid waste management. Through the Osun Waste Management Agency (OWMA), the government is expected to provide solid waste storage, collection, transportation, and disposal services. Nonetheless, residents' awareness of the service put in place is a factor of top priority to ensure satisfactory public participation. According to Nbalisi and Offor 2012, awareness is the foundation for solving solid waste management challenges and implementing better management strategies.

Adeyemo and Gboyesola (2013) reported that the attitude of people towards waste management can be affected by their level of knowledge and awareness of waste management. Juma and Kendi (2015) concluded that access to information influences proper SWM. Kasimu et.al. (2016) assessed the level of public awareness of the waste management problems in Sabon-gari and the extent to which the public awareness strategy put in place by the LG has changed public attitudes towards waste disposal. Their study established that there is a significant relationship between public awareness strategy and solid waste management. This means that if there is an effective public awareness strategy, there will be proper waste disposal by the residents and effective SWM.

Nachalida et al. (2017) carried out a study on barriers to effective municipal SWM in a rapidly urbanizing area in Thailand. The findings show that though there is a good policy put in place to tackle the problem of SWM, part of the barriers to the effectiveness are weak information systems and poor communication between the municipality and residents. Justice et. al. (2021) stated that the poor state of SWM and other known environmental and public health issues in developing countries can be addressed by bridging the environmental knowledge gap through practically oriented environmental education in schools. It is therefore important to investigate residents' awareness of the government-provided solid waste management services in Osun State to raise the implications on effective and efficient SWM, hence this study. In this study, we sought to unravel the residents' educational status, their level of awareness of the government-supported SWM services, the relationship between educational status and awareness level of the solid waste management services, their sources of awareness, and the residents' patronage of the services

2. The Study Area

Osun State is in the Southwestern part of Nigeria as shown in Fig.1. It shares boundaries with Ogun, Kwara, Oyo, and Ondo States in the South, North, West, and East, respectively. Osun State was carved out of old Oyo State by the General Ibrahim Babangida's administration on 27th August 1991.

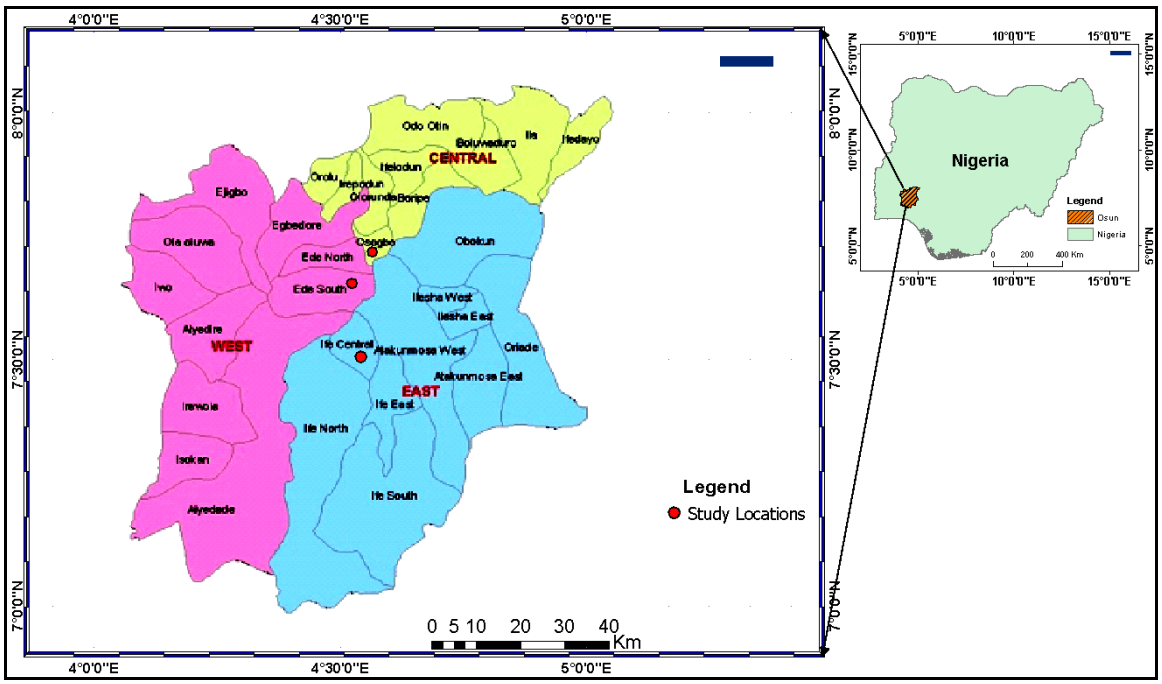

Figure 1: Map Showing the Study Area

The State is divided into three senatorial districts, namely, Osun Central, Osun West, and Osun East. Each of these districts is further divided into two zones. Osun Central consists of Osogbo and Ikirun Zones, while Osun West is made up of Ede and Iwo Zones. Ife and Ilesha Zones are the constituents of the Osun East district. The State is made up of thirty Local Government Areas and the Ife East Area Office. Osun state has a population of 3,423,535 with a growth rate of 3.2 based on the national population and housing census exercise in 2006. According to the National Solid Waste Management Policy (Federal Republic of Nigeria, 1999), the municipal solid waste generation rate is 0.4kg/person/day. This implies that the state can generate about 2,000 tons of solid waste every day, of which larger amounts are generated from residences (Parwiz et. al. 2012, Vivek et.al. 2013)

3. Methodology

The primary data was obtained through the administration of a questionnaire. The residents of the towns covered by the services of Osun Waste Management Authority (OWMA) were the study population.

Multistage sampling was employed for this study. The first stage involved the purposive selection of a town covered by OWMA services from each of the three senatorial districts in Osun State. The towns selected were Osogbo (Osun Central), Ile-Ife (Osun East), and Ede (Osun West). The second stage was the stratification of the selected towns into high, medium, and low-density residential zones. In the third stage, the enumeration of streets in each residential zone revealed that there was a total of 281, 240, and 137 streets in the respective towns. The fourth stage was the selection of a street from every 8 (12.5%). In Osogbo, 35 streets were selected with 8, 21, and 6 streets in the high, medium, and low-density residential zones, respectively. In Ile–Ife, 30 streets were selected for survey, with 7, 1,8, and 5 streets in the high, medium, and low-density residential zones, respectively. In Ede, 17 streets were selected. The distribution showed that 5, 9, and 3 streets were in the high, medium, and low-density residential zones, respectively.

One, out of every 8 buildings, was selected in the selected streets using a systematic sampling technique. Random sampling was adopted to pick the first house. Using this procedure, a total of four hundred and three (403) houses were selected for the survey. The distribution of this figure showed that 157, 139, and 107 houses were selected in Osogbo, Ile–Ife, and Ede, respectively. A household was surveyed in each of the selected buildings, targeting the female household head. This was because women are traditionally responsible for the upkeep of their homes. However, where this was not possible, any other person who was not below the age of 18 in the household was the target. The data collected was analyzed using descriptive statistics

4. Findings and Discussion

4.1 Socioeconomic characteristics

Studies have shown that women handle waste at home across many cultures, including Yoruba culture in which this study was done (Seager et. al., 2020; John et. al., 2023). Therefore, the gender of the expected respondents has been predetermined. The questionnaire was specifically designed for the female household head who was mainly an adult.

Education increases people's knowledge of the health implications of a dirty environment (Sumukwo et. al., 2012, Marjan 2024). It can therefore be said that education will influence the residents' awareness of SWM services. The education status in the study area was grouped into four categories. These are: no formal education, primary, secondary, and tertiary. The educational status of respondents as presented in Table 1 showed that 90.8% of the respondents in the study area had one form of formal education or the other, while 9.2% of the respondents had no formal education. Respondents with formal education in Ile-Ife, Osogbo, and Ede were 93.5%, 91.7%, and 86.0% respectively. In Osogbo, 3.8%, 19.1%, and 68.8% of the respondents had primary, secondary, and tertiary education qualifications, respectively, while the respondents without any formal education accounted for 8.3%. In Ile-Ife, 5.0%, 15.1%, and 73.4% of the respondents had primary, secondary, and tertiary education qualifications, respectively, while 6.5% of the respondents had no formal education.

In Ede, respondents with no formal education accounted for 14.0% while 8.4%, 40.2%, and 37.4% of the respondents had primary, secondary, and tertiary education qualifications, respectively. It was established that while 27.7% of the respondents in the high residential density of Osogbo had no formal education, none were in this educational category in the medium and low densities. Respondents without formal education in Ile-Ife accounted for 14.6%, 4.5%, and 0% in high, medium, and low density, respectively. Also, in Ede, 19.4%, 7.5%, and 16.1% of the respondents had no formal education in the high, medium, and low densities, respectively.

Table 1: Educational Status of the Respondents

Town	Educational Status	Density: High f (%)	Density: Medium f (%)	Density: Low f (%)	Total f (%)
Osogbo	No formal education	13 (27.7)	0 (0.0)	0 (0.0)	13 (8.3)
	Primary	5 (10.6)	1 (1.3)	0 (0.0)	6 (3.8)
	Secondary	16 (34.0)	14 (18.2)	0 (0.0)	30 (19.1)
	Tertiary	13 (27.7)	62 (80.5)	33 (100)	108 (68.8)
	Total	47 (100)	77 (100)	33 (100)	157 (100)
Ile-Ife	No formal education	6 (14.6)	3 (4.5)	0 (0.0)	9 (6.5)
	Primary	6 (14.6)	1 (1.5)	0 (0.0)	7 (5.0)
	Secondary	13 (31.7)	8 (11.9)	0 (0.0)	21 (15.1)
	Tertiary	16 (39.0)	55 (82.1)	31 (100)	102 (73.4)
	Total	41 (100)	67 (100)	31 (100)	139 (100)
Ede	No formal education	7 (19.4)	3 (7.5)	5 (16.1)	15 (14.0)
	Primary	6 (16.7)	3 (7.5)	0 (0.0)	9 (8.4)
	Secondary	21 (58.3)	16 (40.0)	6 (19.4)	43 (40.2)
	Tertiary	2 (5.6)	18 (45.0)	20 (64.5)	40 (37.4)
	Total	36 (100)	40 (100)	31 (100)	107 (100)
Study Area	No formal education	26 (21.0)	6 (3.3)	5 (5.3)	37 (9.2)
	Primary	17 (13.7)	5 (2.7)	0 (0.0)	22 (5.5)
	Secondary	50 (40.3)	38 (20.7)	6 (6.3)	94 (23.3)
	Tertiary	31 (25.0)	135 (73.4)	84 (88.4)	250 (62.0)
	Total	124 (100)	184 (100)	95 (100)	403 (100)

Evidence from findings showed that the highest proportion of the respondents in Osogbo and Ile-Ife had tertiary education (68.8% and 73.4% respectively). However, findings revealed that respondents with secondary education had the highest percentage (40.2%) in Ede. Further findings revealed that the highest percentage of respondents without formal education (14.0%) was in Ede, while the lowest percentage of respondents with tertiary education was also in the town. It is therefore obvious that Ede had the lowest level of education among the three towns under study. Also, the respondents with no formal education were concentrated in the high-density area, while the low-density area housed the highest number of respondents with tertiary education. These findings thus confirmed the previous findings (Afon and Badiora 2018, Adeniyi 2023) that educational status varied directly with the increase in distance from the high to the low densities. This implies that informal sources of awareness will be more effective in the high-density areas, while the formal sources of awareness will be more appreciated in the low-density areas.

4.2 The Knowledge Factor: Residents' Awareness of the Government-Supported Solid Waste Management Services

From the analysis presented in Table 2, it was established that the majority (87%) of the respondents in the study area were aware of the SWM services put in place by the government through OWMA. It was also discovered that Osogbo had the highest percentage of respondents who were aware. Second in level of awareness were the respondents in Ede, while Ile-Ife had the lowest percentage of respondents who were aware.

This could be attributed to the fact that Osogbo is the state capital and more priority is given to this area than the other towns of the state. That is, the concentration of the OWMA activities in this area was higher. Therefore, awareness decreases as the distance increases from the state capital.

Table 2: Residents' Awareness of the Solid Waste Management Services

Town	Density: High f (%)	Density: Medium f (%)	Density: Low f (%)	Total f (%)
Osogbo	45 (95.7)	74 (96.1)	31 (93.9)	15 (95.5)
Ile-Ife	23 (56.1)	57 (85.1)	29 (93.5)	109 (78.4)
Ede	30 (83.3)	34 (85.0)	28 (90.3)	92 (86.0)
Study Area	98 (79.0)	165 (89.7)	88 (92.6)	351(87.1)

High densities of Ede and Ile-Ife had the lowest number of respondents who were aware of the services, while the highest number of respondents with awareness was in the low-density areas. It can

thus be inferred that the awareness of the SWM services varied directly with an increase in distance from the high-density to the low-density. This was, however, contrary to the situation in Osogbo. In Osogbo, the highest level of awareness (96.1%) of OWMA activities was among the respondents in the medium density. It was also established that 95.7% of the respondents in the high-density area were aware, while 93.9% were aware in the low area.

4.3 Relationship between Residents' Educational Status and Awareness Level of the Solid Waste Management Services

Respondents with tertiary education had the highest percentage of awareness (62.4%). While 23.1% of the respondents who were aware of the SWM services had secondary education, 9.4% of the aware respondents had no formal education. The lowest percentage (5.1%) of the respondents who were aware had primary education. This indicates that individuals with higher levels of education tend to have greater awareness of environmental issues, supporting similar findings in the previous study of Justice et al. (2021). Surprisingly, respondents with no formal education were more aware of the SWM services than the respondents with primary education as their highest qualification.

4.4 Residents' Sources of Awareness of the Solid Waste Management Services

The most important source through which the respondents became aware of the OWMA services in Osogbo, Ile-Ife, and Ede was seeing solid waste collection vehicles. This source constituted 21.6%, 24.8%, and 30.2% in Osogbo, Ile-Ife, and Ede, respectively.

In Osogbo, findings established that most of the important sources of awareness were through the physical observation of the environment by the respondents. These sources include workers in uniform, when requesting the cost of collection, placement of storage tank, and the name on vehicles. This accounted for 16.9%, 13.3%, 10.1% and 10.1 respectively. The formal sources of information, like radio, leaflets, television, public awareness campaigns, and political campaigns, had lower percentages. They are 12.5%, 3.2%, 5.2%, 4.2% and 2.8% respectively. This case was not too different from that of Ile-Ife and Ede. The major source of awareness in the study area is not effective enough to educate the residents on the importance of proper solid waste management.

Table 3: Educational Status and Awareness of the Solid Waste Management Services

	Aware Respondents				
Town	No Formal Education f (%)	Primary f (%)	Secondary f (%)	Tertiary f (%)	Total f (%)
Osogbo	13 (8.7)	6 (4.0)	30 (20.0)	101 (67.3)	150 (100.0)
Ile-Ife	6 (5.5)	3 (2.8)	18 (16.5)	82 (75.2)	109 (100.0)
Ede	14 (15.2)	9 (9.8)	33 (35.9)	36 (39.1)	92 (100.0)
Study Area	33(9.4)	18 (5.1)	81 (23.1)	219 (62.4)	351(100.0)

	Density						
	High		Medium		Low		Total
Town Sources	f (%)	Sources	f (%)	Sources	f (%)	Sources	f (%)
Osogbo							
Workers in uniform	40 (8.1)	Seeing collection vehicles	65 (13.1)	Seeing collection vehicles	22 (4.4)	Seeing collection vehicles	107 (21.6)
Name on vehicles	22 (4.4)	When requesting for cost of collection	36 (7.3)	Radio jingle	22 (4.4)	Workers in uniform	84 (16.9)
Placement of CWSR	21 (4.2)	Workers in uniform	29 (5.8)	Workers in uniform	15 (3.0)	When requesting for cost of collection	66 (13.3)
Seeing collection vehicles	20 (4.0)	Placement of CWSR	26 (5.2)	When requesting for cost of collection	10 (2.0)	Radio jingle	62 (12.5)
When requesting for cost of collection	20 (4.0)	Radio jingle	21 (4.2)	Name on vehicles	7 (1.4)	Name on vehicles	50 (10.1)
Radio jingle	19 (3.8)	Name on vehicles	21 (4.2)	Television	6 (1.2)	Placement of CWSR	50 (10.1)

Town	Sources	Density: High f (%)	Sources	Medium f (%)	Sources	Low f (%)	Sources	Total f (%)
	Leaflets	0 (0.0)	Television	20 (4.0)	Political campaign	5 (1.0)	Television	26 (5.2)
	Public awareness campaign	0 (0.0)	Public awareness campaign	16 (3.2)	Public awareness campaign	5 (1.0)	Public awareness campaign	21 (4.2)
	Television	0 (0.0)	Leaflets	12 (2.4)	Leaflets	4 (0.8)	Leaflets	16 (3.2)
	Political campaign	0 (0.0)	Political campaign	9 (1.8)	Placement of CWSR	3 (0.6)	Political campaign	14 (2.8)
	Total	42 (28.6)	Total	255 (51.4)	Total	99 (20.0)	Total	496 (100.0)
Ile-Ife								
	Seeing collection vehicles	20 (5.2)	Seeing collection vehicles	52 (13.6)	Seeing collection vehicles	23 (6.0)	Seeing collection vehicles	95 (24.8)
	Name on vehicles	9 (2.3)	When requesting for cost of collection	22 (5.7)	When requesting for cost of collection	22 (5.7)	When requesting for cost of collection	49 (12.8)
	Workers in uniform	9 (2.3)	Workers in uniform	17 (4.4)	Placement of CWSR	20 (5.2)	Name on vehicles	39 (10.2)
	Public awareness campaign	7 (1.8)	Radio jingle	17 (4.4)	Television	17 (4.4)	Workers in uniform	35 (9.1)
	Radio jingle	7 (1.8)	Name on vehicles	15 (3.9)	Name on vehicles	15 (3.9)	Radio jingle	33 (8.6)
	Television	6 (1.6)	Public awareness campaign	14 (3.7)	Workers in uniform	9 (2.3)	Placement of CWSR	32 (8.4)
	Political campaign	5 (1.3)	Leaflets	12 (3.1)	Radio jingle	9 (2.3)	Television	31 (8.1)
	When requesting for cost of collection	5 (1.3)	Placement of CWSR	9 (2.3)	Public awareness campaign	9 (2.3)	Public awareness campaign	30 (7.8)
	Leaflets	4 (1.0)	Television	8 (2.1)	Leaflets	8 (2.1)	Leaflets	24 (6.3)
	Placement of CWSR	3 (0.8)	Political campaign	6 (1.6)	Political campaign	4 (1.0)	Political campaign	15 (3.9)
	Total	75 (19.6)	Total	172 (44.9)	Total	136 (35.5)	Total	383(100.0)
Ede								
	Seeing collection vehicles	28 (12.6)	Seeing collection vehicles	28 (12.6)	Leaflets	17 (7.7)	Seeing collection vehicles	67 (30.2)
	When requesting for cost of collection	11 (5.0)	When requesting for cost of collection	18 (8.1)	Public awareness campaign	16 (7.2)	When requesting for cost of collection	35 (15.8)
	Name on vehicles	8 (3.6)	Name on vehicles	15 (6.8)	Seeing collection vehicles	11 (5.0)	Name on vehicles	25 (11.3)
	Television	7 (3.2)	Workers in uniform	10 (4.5)	When requesting for cost of collection	6 (2.7)	Public awareness campaign	19 (8.6)
	Political campaign	5 (2.3)	Placement of CWSR	4 (1.8)	Television	5 (2.3)	Leaflets	18 (8.1)
	Workers in uniform	4 (1.8)	Radio jingle	4 (1.8)	Political campaign	5 (2.3)	Television	16 (7.2)
	Radio jingle	3 (1.4)	Television	4 (1.8)	Name on vehicles	2 (0.9)	Workers in uniform	15 (6.8)
	Public awareness campaign	2 (0.9)	Political campaign	4 (1.8)	Workers in uniform	As	Political campaign	14 (6.3)
	Placement of CWSR	0 (0.0)	Leaflets	1 (0.5)	Radio jingle	1 (0.5)	Radio jingle	8 (3.6)
	Leaflets	0 (0.0)	Public awareness campaign	1 (0.5)	Placement of CWSR	1 (0.5)	Placement of CWSR	5 (2.3)
	Total	68 (30.6)	Total	89 (40.1)	Total	65 (29.3)	Total	222 (100.0)

Note: CWSR – Communal Waste Storage Receptacles

4.5 Residents' Patronage of Solid Waste Management Service

Table 5 shows that 225 residents, representing 55.8% of the total respondents, were the patrons of OWMA services. This indicated that, generally, the level of patronage of the services was low. The largest number of subscribers to OWMA SWM services was in Osogbo. This was where 50.7% of the respondents subscribed to the services provided by OWMA. In Ile-Ife, only 26.5% utilized the services, while 23.2% of the respondents in Ede were subscribers.

Table 5: Residents' Patronage of Solid Waste Management Service

Town	Patronise f (%)	Do not Patronise f (%)	Total f (%)
Osogbo	80 (50.7)	77 (49.3)	157 (100)
Ile-Ife	37 (26.5)	102 (73.5)	139 (100)
Ede	25 (23.2)	82 (76.8)	107 (100)
Study Area	225 (55.8)	178 (44.2)	88 (100)

5. Conclusion

The study showed that many of the respondents had a high level of education, which is a significant factor that influenced their ability to be aware of the SWM service. This will also contribute to understanding the information that will be disseminated through public education and awareness programs (Juma and Kendi 2015). Therefore, educational status has a vital role to play in public enlightenment awareness on the issue of solid waste management.

The majority of the respondents in the study area were aware of the SWM services put in place by the government through OWMA. It was also discovered that Osogbo had the highest percentage of respondents who were aware. The second level of awareness was reached by the respondents in Ede, while Ile-Ife had the lowest percentage of respondents who were aware. Hence, awareness decreases as the distance increases from the state capital.

However, the major source through which the respondents became aware of the OWMA services in Osogbo, Ile-Ife, and Ede was through seeing the solid waste collection vehicles. This source is not effective enough to educate the residents on the importance of proper solid waste management, the need to put the SWM service provided by OWMA to use, and the major roles to play for proper usage. As a result of this, the patronage level of the service is low.

It is discovered from the study that the effort put in place to ensure public awareness through formal sources of information is low, knowing well that a high level of education is recorded in the study area. It can therefore be concluded that this lag in residents' awareness is a contributing factor to the low patronage of the service provided. Thus, ineffective residents' awareness has a significant implication on the effectiveness of the government-provided solid waste management service in Osun State.

To ensure the right solid waste management education for the residents and proper usage of the service provided, the following are recommended:

- It is generally known that most of the market population is women, and they are mainly responsible for the duty of solid waste management at home. Public awareness and education should be organized monthly for market women on the dangers of improper SWM, the importance of proper SWM, the availability of the government-provided SWM service by OWMA, proper usage of the service, and expected roles from the residents.
- Environmental education activities like clubs, seminars, and talk shows should be organized by school authorities among students and pupils to inculcate the habit of proper SWM into them from the cradle.
- It is discovered from the study that awareness through radio and television stations is very low. Thus, this finding suggests that the government can utilize these platforms to disseminate intensive solid waste management information and OWMA activities.
- Print media and posters should be placed in strategic places in the neighbourhood, like watering points, as well as on billboards.

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